



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,630	03/06/2002	David S.Y. Hsu	83,661	5396

26384 7590 03/24/2004

NAVAL RESEARCH LABORATORY  
ASSOCIATE COUNSEL (PATENTS)  
CODE 1008.2  
4555 OVERLOOK AVENUE, S.W.  
WASHINGTON, DC 20375-5320

EXAMINER

CLEVELAND, MICHAEL B

ART UNIT PAPER NUMBER

1762

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AC

<b>Office Action Summary</b>	<b>Application No.</b> 10/090,630	<b>Applicant(s)</b> HSU ET AL.	
	<b>Examiner</b> Michael Cleveland	<b>Art Unit</b> 1762	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 18-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The rejections under 35 USC 112, 1<sup>st</sup> paragraph are withdrawn in view of Applicant's amendment.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claim 18-27 are rejected under 35 U.S.C. 103(a) as being obvious over Fratello et al. (U.S. Patent 4,965,091, hereafter '091) in view of Harmer et al. (U.S. patent 5,824,622, hereafter '622) and Forster et al. (U.S. Patent 5,611,961, hereafter '961).

Claims 18, 26-27: '091 teach a method of preparing a multilayer phosphor product (col. 3, lines 51-59) of terbium-activated yttrium orthosilicate (col. 4, lines 1-5) on a substrate comprising the steps of:

- a) providing a solution comprising an yttrium precursor and a terbium (i.e., dopant) precursor (col. 4, lines 12-16). In the example, the yttrium precursor is a nitrate. However, col. 3, lines 26-48 teach that the yttrium precursor may be an alkoxide instead;
- b) mixing said solution with a silicon precursor (col. 4, lines 6-19);

Art Unit: 1762

c) inducing a sol-gel condensation reaction comprising the precursors (col. 3, lines 48-52);

d) spreading the sol-gel mixture on a substrate (col. 3, lines 51-52; col. 4, lines 35-39);

e) drying the sol-gel reaction mixture (col. 3, lines 53-56; col. 4, lines 37-39);

f) repeating steps (d) and (e) if necessary to produce a desired thickness producing a desired thickness of film (col. 3, lines 52-56); and

g) heating the thick film to form the phosphor (col. 3, lines 60-64).

'091 does not teach that the silicon precursor is a solid particle with an average particle size of about 7 nm. '091 teaches that the purpose of the alkoxide precursors is to form a continuous [metal] cation-oxygen network (col. 3, lines 56-59). Tetraethyl orthosilicate (TEOS) is a preferred precursor of such networks. '622 teaches a variety of operative silicon-containing precursors for forming metal oxide networks, including TEOS and fumed silica (col. 5, lines 4-40). The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used fumed silica as the particular silicon precursor of '091 because '622 teaches that fumed silica is operative as a sol-gel precursor for the formation of metal oxide networks.

'622 is silent as to the diameter of the fumed silica. Therefore, '091 and '622 do not teach that the fumed silica has an average particle diameter of about 7 nm. However, '961 teaches the formation of phosphor from precursors, including fumed silica with average particle sizes of less than 50 nm (Abstract, claim 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used average particle sizes of less than 50 nm for the fumed silica of '091 and '622 because '961 teaches the operability of such particle sizes as the particle size of fumed silica when use as a phosphor precursor. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range, including an average particle diameter of about 7 nm, disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 19: '091 teaches that the solution may contain water, a hydrolysis agent (col. 4, lines 14-17).

Claims 20-21, 23-24: '091 teaches that additional water, one of applicant's particularly claimed hydrolysis agents, may be added just before gellation begins (col. 3, lines 48-52; col. 4, lines 13-34).

Claim 22: The solution may contain hydrochloric acid (col. 4, lines 14-16), a reagent capable of inhibiting condensation reactions (see application, p. 9, lines 8-11).

Claim 25: The dopant precursor may be terbium nitrate (col. 4, lines 14-16), an inorganic salt.

#### *Response to Arguments*

5. Applicant's arguments filed 1/16/2004 have been fully considered but they are not persuasive.

Applicant statement that Fratello was not cited in the Notice of References Cited is noted. Fratello '091 was first made of record in the application with the action of 6/27/2002 and was cited on the PTO-892 accompanying that action. It will therefore appear on the front of any patent that issues from the current application.

Applicant argues that Fratello's statement that "it is believed" does not rise to the level of a teaching. The argument is unconvincing because '091 teaches that it uses a sol, teaches that the sol forms by hydrolysis and polymerization, and teaches that the hydrolysis and polymerization of alkoxides lead to a continuous network, as taught by Fratello at '091, col. 3, lines 39-59 and Harmer '622, col. 5, lines 14-50. Applicant argues that the citation at col. 3, lines 56-59 does not discuss alkoxide precursors per se. The argument is unconvincing because the paragraph as a whole does discuss that metal alkoxides are the compounds which polymerize on hydrolysis (col. 3, lines 45-48).

Applicant argues that Fratello '091 does not discuss a sol-gel reaction mixture to form a multilayer phosphor film. The statement is incorrect. '091 teaches a sol-gel reaction to form a phosphor film, as clearly indicated at col. 3, lines 1-8; it teaches a reaction mixture, as indicated at col. 3, lines 39-59; and it teaches that it is a multilayer film at col. 3, lines 52-56. Therefore, Fratello '091 teaches a sol-gel reaction mixture to form a multilayer phosphor film. In response

Art Unit: 1762

to applicant's argument that Fratello '091 is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Fratello '091 is in the field of Applicant's endeavor, i.e., the use of a sol-gel reaction to form a multilayer phosphor film.

Applicant argues that Harmer '622 does not discuss a solid-liquid reaction mixture. The argument is incorrect. '622 teaches that the sol-gels have solvents (i.e., liquid, col. 6, lines 9-20), and solids, such as the suspended particles of colloidal silica (col. 5, lines 40-45). In response to applicant's argument that Harmer '622 is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Harmer '622 is reasonably pertinent to the particular problem with which applicant was concerned, namely the selection of silicon precursors to be used in forming metal oxide sol-gel networks.

In response to applicant's argument that Forster '921 is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Forster '921 is reasonably pertinent to the particular problem with which the applicant was concerned, namely the selection of a size of fumed silica compatible for use to form luminescent compounds.

Applicant argues that the Examiner's statement that Forster '921 does not teach the formation of "phosphor for precursors". As noted by Applicant, '921 teaches the formation of a "phosphor from precursors". The typo has been corrected. Applicant argues that the conclusion of obviousness is incorrect because '961 relates to a method of preparing phosphor and not the use of phosphors as precursors. However, the rejection is based upon the suitability of silica as a precursor for the phosphor. Therefore, Applicant's argument supports the Examiner's position.

Art Unit: 1762

Applicant argues that a teaching of “less than 50 nm” is not a teaching of 7 nm and that the patent limits the range to 10-50 nm during the description of the exemplary embodiment. The argument is unconvincing because the description of the preferred range of 10-50 nm does not obscure the teachings of the entire range of “less than 50 nm” elsewhere in the reference. Furthermore, it has been held that changes in size are not sufficient to patentably distinguish over prior art. See MPEP 2144.04.IV.A. and cases cited therein. There is no evidence of record attributing criticality to the use of a solid precursor with an average particle size of about 7 nm.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the references teach the suitability of fumed silica as a sol-gel precursor and the suitability of sizes of fumed silica less than 50 nm as precursors for forming phosphor materials. It has long been held that the selection of something based on its known suitability for its intended use is sufficient motivation to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

### ***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 1762

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 9-5:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Michael Cleveland  
Patent Examiner  
March 22, 2004